

Amendments to the Claims:

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A position control method by motor drive comprising:

rotating a rotor of said motor drive according to the given target opening, and detecting the opening of a movable vane by an encoder, said motor opening and shutting a passage of an intake air pipe to a turbo charger of an automobile by the movable vane, and

controlling the movable vane in the passage of said intake air pipe to reach the target opening,

wherein

the rotational position of the motor drive is controlled to a stop position in the direction where said movable vane is closed, and a stop position in the direction where said movable vane is opened, and

the motor drive is controlled so that the passage of the intake air pipe ~~become~~ becomes the target opening by setting said stop position as an operation reference position of said motor drive, and setting between said stop positions as driving dynamic range of said motor.

2. (Previously Presented) A position control method by motor drive according to claim 1, wherein the operation of said rotor which obtains the operation reference position of said motor drive is executed at power-on or when an ignition switch is turned on or turned off.

3. (Previously Presented) A position control method by motor drive according to claim 1, wherein said motor drive is driven in a direction where the pipe to said turbo charger is opened and the direction where said pipe is shut by the driving force provided beforehand so that sticking at the stop position

avoided, and

when the time that the signal of the encoder which detects said opening does not change elapses a predetermined time, the positions of said encoder are set as a reference position for full open operation of the movable vane and a reference position for full close operation of the movable vane.

4. (Previously Presented) A position control method by motor drive according to claim 1, wherein the control of revolution of the motor drive to the stop position in the direction where said movable vane is shut and the stop position in the direction where said movable vane is opened is executed when an ignition switch is off.

5. (Currently Amended) A position control method by motor drive according to claim 1, wherein a PID control is executed with the target opening changed into an open direction of the movable vane one by one, and the opening position is set as a stop position in an open direction of said movable vane when the state that the opening position counted by said encoder does not change continues during a predetermined time.

6. (Previously Presented) A position control method by motor drive according to claim 1, wherein a PID control is executed with the target opening changed into a close direction of the movable vane one by one, and the opening position is set as a stop position in a close direction of said movable vane when the state that the opening position counted by said encoder does not change continues during a predetermined time.

7. (Previously Presented) A position control unit by motor drive comprising:

a control unit including an interface circuit, a central processing unit and a motor driver which drives a motor drive according to a target opening signal; and

a motor rotational position detecting unit provided on an output shaft of the motor; and

an adjustable link united with the output shaft of the motor drive, which controls opening and shutting of a movable vane in an intake air pipe to a turbocharger of an automobile according to the revolution of the motor drive;

wherein

said motor is rotated to the stop position of said turbo charger in a direction where the intake air pipe is shut and the stop position in a direction where the intake air pipe is opened by the motor drive, and the position between said stop positions is set as an operation reference position when said motor works.

8. (Currently Amended) A position control method by motor drive according to claim 1, wherein ~~the~~ a PID control is executed with said motor controlled at a predetermined constant rotational speed, then the target opening changed stepwise by a predetermined opening value, and ~~the~~ an opening position is set as ~~a~~ the stop position in ~~an~~ a close direction or ~~a~~ the stop position in an open direction of said movable vane when the state that the opening position counted by said encoder does not change continues during the predetermined time.

9. (Currently Amended) A position control method by motor drive according to claim 1, wherein ~~the~~ a PID control is executed with said motor controlled at a predetermined constant rotational speed, the target opening changed stepwise by a predetermined opening value in an opposite direction in case that the target opening position does not change during the first predetermined time, then the opening changed stepwise by a predetermined opening value, and ~~the~~ an opening position is set as a stop position in ~~an~~ a close direction or ~~a~~ the stop position in an open direction of said movable vane when the state that the opening position counted by said encoder does not change

continues during the second predetermined time longer than said first predetermined time.

10. (Currently Amended) A position control method by motor drive according to claim 1, wherein ~~the~~ a PID control is executed with the target opening changed stepwise into ~~an~~ a close direction or an open direction of the movable vane with an individual change step value decreasing sequentially, and ~~the~~ an opening position is set as ~~a~~ the stop position in an close direction of said movable vane when the state that the opening position counted by said encoder does not change continues during the predetermined time.

11. (Previously Presented) A position control method by motor drive according to claim 1, wherein an initialization operation for obtaining an operation reference position of said motor is executed when a drive time after initialization reaches a predetermined value, or the number of moving operations of said movable vane reaches a predetermined value, or a drive distance reaches a predetermined value, or a moving range of said movable vane becomes smaller than a predetermined range.

12. (Currently Amended) A position control unit by motor drive according to claim 7, wherein, when obtaining said operation reference position of said motor, said motor is operated with a predetermined drive force preventing said motor from being locked, and a position provided by said motor rotational position detecting unit is judged as a stop position in an close direction if a rotational direction of said motor is at least such a direction as a supercharge pressure of a turbocharger of an automobile is ~~mad-e~~ made to decrease by opening an intake air pipe to a turbocharger of an automobile and if the state that the signal from said motor rotational position detecting unit does not change continues during a predetermined time.

13. (Previously Presented) A position control unit by motor drive according to claim 7, wherein, when obtaining said operation reference position of said motor, said motor is operated until reaching a stopper with a drive force being made increased gradually and with a rotational speed preventing said motor from being mechanically locked, and a position provided by said motor rotational position detecting unit is judged as a stopper position if a rotational direction of said motor is at least such a direction as opening an intake air pipe to a turbocharger of an automobile, and then said motor is rotated backward at least once to an operation start position or the intermediate position between an operation start position and a present position and moved again toward in a rotational direction to a stopper position with the same speed as used before, and then if the state that said motor reaches a stopper position and a signal from said motor rotational position detecting unit does not change continues during a predetermined time.

14. (Previously Presented) A position control unit by motor drive according to claim 7, wherein, an operation for said operation reference position of said motor is executed at least when an power is applied, or when IGN signal is turned ON, or when IGN signal is turned OFF.

15. (Previously Presented) A position control unit by motor drive according to claim 7, wherein an operation for said operation reference position of said motor is terminated and a normal control operation is resumed when an target opening position signal changes during said operation for said operation reference position of said motor.

16. (Previously Presented) A position control unit by motor drive according to claim 7, wherein an initialization operation for obtaining an operation reference position of said motor is executed when a drive time after initialization reaches a predetermined value, or the number of moving operations of said movable vane reaches a predetermined value, or a drive distance reaches

a predetermined value, or a moving range of said movable vane becomes smaller than a predetermined range.

17. (Previously Presented) A position control unit by motor drive according to claim 7, wherein said operation for obtaining said operation reference position of said motor is initiated at least by a supercharge signal of a turbocharger supplied as an external input signal provided externally via an input and output I/F circuit, or an A/D input circuit or a communication circuit, and said operation for obtaining said operation reference position of said motor is allowed at least once if the state that an engine is rotated and that a supercharge pressure of a turbocharger becomes less than or equal to a constant value continues during a predetermined time.

18. (Previously Presented) A position control unit by motor drive according to claim 7, wherein said operation for obtaining said operation reference position of said motor is initiated at least by an operation enabling signal for obtaining said operation reference position of said motor supplied as an external input signal provided externally via a communication circuit, and said operation for obtaining said operation reference position of said motor is executed at least once while said operation enabling signal is supplied.

19. (Previously Presented) A position control unit by motor drive according to claim 7, wherein, when said operation for obtaining said operation reference position of said motor is executed, a displacement of said movable vane from a fully-close position to a fully-open position and a displacement estimated mechanically are compared with each other, and an abnormal state of a motor control unit is judged when a difference between said displacement exceeds a predetermined value.

20. (Previously Presented) A position control unit by motor drive according to claim 7, wherein, in case of detecting an abnormal state of a motor

control unit, a supercharge pressure of a turbocharger is made decreased by opening an intake air pipe to a turbocharger during a constant time and then said opening operation is terminated.

21. (Previously Presented) A position control unit by motor drive according to claim 7, wherein, in case that an operation of motor drive is terminated between a fully-close position and a fully-open position, a motor is moved at least once backward in an original direction and then a motor is operated again after moving back in a predetermined displacement value.

22. (Previously Presented) A position control unit by motor drive according to claim 7, wherein, in case that a normal control operation is required while executing an operation for detecting a present position of a motor by suspending a normal control operation and moving a motor toward a fully-close position or a fully-open position, a motor is driven in a rotational speed faster than a normal control operation in order to prevent a delayed response time due to moving a motor toward a fully-close position or a fully-open position in comparison with a normal control operation.

23. (Currently Amended) A position control unit by motor drive according to claim 7, wherein a target position with respect to a present position is estimated sequentially by applying repeatedly a predetermined small value when initializing said position control unit by motor drive, and a motor is moved toward a fully-close position or a fully-open position by ~~means of~~ a PID control.